US-PAT-NO: 5812771

DOCUMENT-IDENTIFIER: US 5812771 A

TITLE: Distributed chassis agent for distributed network management

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Application Filing Date - AD (1):
19960510

Brief Summary Text - BSTX (5):
In one prior art system, all management functions are provided on one module ("the management module") which is plugged into the networking chassis. A "networking chassis" is a housing and backplane which receives "networking cards" that perform various networking services, such as repeating, bridging and **routing**. Each networking card or module includes its own microprocessor. In this prior art system, the "management module" has all of the hardware and firmware necessary to collect, store and process all of the data required to manage the system. This creates a serious problem if there is a malfunction in the management module and it needs to be pulled, i.e., there is nothing left to manage the system. To guard against this catastrophe, the user may purchase a spare module but this is an expensive method of insurance. Also, even during normal operation, consolidating all of the management functions in one module creates a potential bottleneck when there is an increasing level of transmissions and/or processing. Still further, the management module has a defined capacity and thus there is an upper limit on the amount of allowable network expansion (i.e., increase in the number of **ports** and/or traffic). For this reason, the purchaser of the system must decide whether to buy a larger management system than it presently needs but which will accommodate future expansion, or an adequate system which may have to be fully replaced if there is further expansion.

Detailed Description Text - DETX (8):
Logically a traditional networking chassis may be viewed as a collection of network service providers connected via a common network (or networks). The common network (or networks) is provided by the chassis'backplane. FIG. 2 is a logical view of a networking chassis showing a pair of backplanes 20, 22 with connections to three modules 24, 26, 28, and each of the modules having a series of front panel **ports** 25, 27, 29, respectively.

Detailed Description Text - DETX (9):
Networking modules are microprocessor based (CPUs 24A, 26A, 28A in FIG. 2) and are generally constructed with two or more network **ports**; the network **ports** may appear at the front panel of the module (**ports** 25, 27, 29), or may be **ports**

that connect to the chassis backplane (**ports** 19, 21, 23). The network **ports** are used for two purposes, firstly to perform networking services as repeating, bridging and **routing,** and secondly to provide access to the modules microprocessor for management purposes. Modules are traditionally managed using the SNMP protocol, a protocol which is part of the TCP/IP protocol suite. Each module is required to have its own network address known as an IP address. Each module also has a data link address known as a MAC address.

Detailed Description Text - DETX (15):

The apparatus of the present invention, hereinafter referred to as the "Distributed Chassis Agent" (DCA), builds upon this model using the SNMP process in each module but only requiring a **single IP and MAC address** for the entire chassis. Also the DCA allows MIBs to be distributed across all modules in the chassis and accessible by each module's SNMP process. This allows the chassis to be viewed as a single system for management purposes rather than a collection of systems. The chassis and all it contains can be managed via a single agent who's work load is distributed across all the modules in the chassis. The construction of the DCA is broken down into the following parts:

Detailed Description Text - DETX (78):

Packets destined for the Distributed Chassis Agent DCA (i.e., packets using the chassis IP/MAC address as the destination address) may arrive at the chassis via any one (or more) of its front panel **ports** (see **ports** 25, 27, 29 in FIG. 2), or in the case of the present implementation, it may also arrive via the SMB10, as the SMB1O is externalized. The packet is terminated (from the network point of view) at the entry point to the chassis. The module terminating the packet has two choices after it has terminated a packet destined to the DCA:

Other Reference Publication - OREF (3):

E. Oliveira et al., "Controlling Cooperative Experts In A Real Time System," University of **Porto,** Portugal, IEEE, London, UK, Third International Conference in Sotfware Engineering For Real Time Systems (Conf. Publ.) No. 344, pp. 176-181 (Sep. 16-18, 1991).